

Chair of Computational Mechanics

Department of Vehicle Dynamics, BMW AG

Modelling 2, Mathematics 5, Programming 4

## Software Lab:

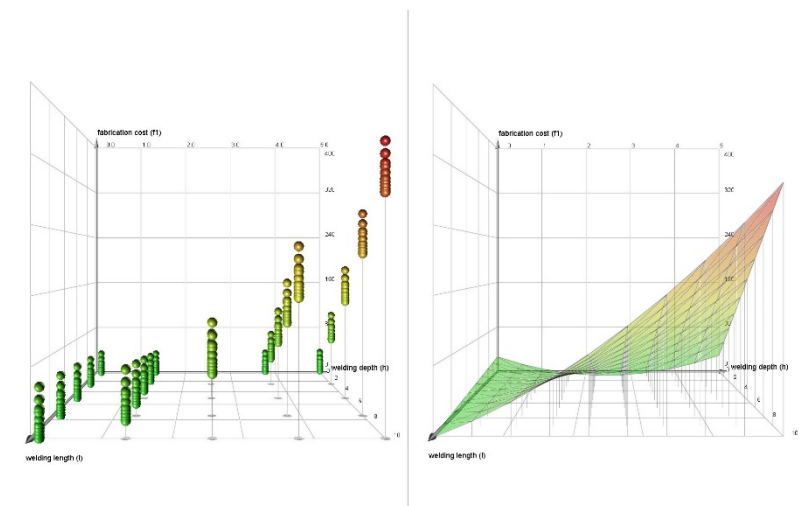
### Preprocessing and response surface computation for large scale problems

#### Setting

Response surfaces Methodology (RSM) explores the relationships between several explanatory variables and one or more response variables. RSM uses a sequence of designed experiments to obtain an optimal response.

In the vehicle industries complex models are used on which the evaluation of each single design has a high computational effort. Thus it is not possible to profitably run optimization algorithms on these models. Instead huge data sets are created. Based on this data response surface models are computed, which significantly reduce the evaluation of a single design.

Unfortunately it is very difficult to compute response surfaces which fulfill the required quality requirements. In order to improve the quality of the RSM an appropriate preprocessor and suitable response surface model have to be used.



#### Task

Develop a MATLAB application that analyzes different provided data sets using

- Sensitivity Analysis
- Correlation Indices
- Filtering

Based on these results a response surface is computed. Therefore different algorithms shall be implemented

- Support Vector machine
- Neural Networks
- Regression

These algorithms have different initialization parameters which have to be optimized. The evaluation of the model is based on suitable quality measure (e.g. R-squared). In addition a graphical user interface which allows to upload new data files, change the settings for the preprocessing as well as the algorithms and displays the results of the RSM has to be implemented.

#### Supervisor

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